

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Frequency Converter

with type designation(s)
Vacon 100 series,

Issued to
Vacon Ltd
VAASA, Finland

is found to comply with
DNV GL rules for classification – Ships, offshore units, and high speed and light craft

Application :

Frequency Converter for Asynchronous Motors Range: 0,55 kW to 800 kW
208-240 / 380-480 (500) / 525-690 VAC supply.

Products approved by this certificate are accepted for installation on all vessels classed by DNV GL.

Issued at **Høvik** on **2019-05-21**

for **DNV GL**

This Certificate is valid until **2021-03-14**.

DNV GL local station: **Finland CMC**

Approval Engineer: **Nicolay Horn**

.....
Trond Sjøvåg
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.



Job Id: **262.1-020692-5**
 Certificate No: **TAE00000XZ**
 Revision No: **3**

Name and place of manufacturer

Vacon Ltd VAASA, Finland	Vacon (China) Drives Co., Ltd, Haiyan Branch JIAXING CITY, ZHEJIANG PROVINCE, P.R. China
-----------------------------	---

Product Description:

Vacon 100. Frequency converter for use in various marine applications. Applicable in 3 enclosure options:

1. Wall-Mounted**, IP21/IP54
2. IP00 Module**
3. Enclosed Drive**, IP21/IP54

Mains voltage 208-240V, 50/60Hz, 3~			
Frequency Converter type	Current rating 45 °C continuous current I_{Lout} (A)	Frame size	Enclosure Options
0100-3L-0003-2-xxxx	3,15	MR4	1
0100-3L-0004-2-xxxx	4,25	MR4	1
0100-3L-0007-2-xxxx	5,7	MR4	1
0100-3L-0008-2-xxxx	7,3	MR4	1
0100-3L-0011-2-xxxx	9,5	MR4	1
0100-3L-0012-2-xxxx	11,05	MR4	1
0100-3L-0018-2-xxxx	15,25	MR5	1
0100-3L-0024-2-xxxx	21	MR5	1
0100-3L-0031-2-xxxx	28	MR5	1
0100-3L-0048-2-xxxx	39,5	MR6	1
0100-3L-0062-2-xxxx	55	MR6	1
0100-3L-0075-2-xxxx	68,5	MR7	1
0100-3L-0088-2-xxxx	81,5	MR7	1
0100-3L-0105-2-xxxx	96,5	MR7	1
0100-3L-0140-2-xxxx	127	MR8	1, 2 and 3
0100-3L-0170-2-xxxx	155	MR8	1, 2 and 3
0100-3L-0205-2-xxxx	187,5	MR8	1, 2 and 3
0100-3L-0261-2-xxxx	236	MR9A	1, 2 and 3
0100-3L-0310-2-xxxx	280,5	MR9A	1, 2 and 3

Mains voltage 380-480V (500V), 50/60Hz, 3~			
Frequency Converter type	Current rating 45 °C continuous current I_{Lout} (A)	Frame size	Enclosure Options
0100-3L-0003-5-xxxx	3	MR4	1
0100-3L-0004-5-xxxx	4,1	MR4	1
0100-3L-0005-5-xxxx	4,95	MR4	1
0100-3L-0008-5-xxxx	6,8	MR4	1
0100-3L-0009-5-xxxx	8,8	MR4	1
0100-3L-0012-5-xxxx	10,8	MR4	1
0100-3L-0016-5-xxxx	14	MR5	1
0100-3L-0023-5-xxxx	19,5	MR5	1
0100-3L-0031-5-xxxx	27	MR5	1
0100-3L-0038-5-xxxx	34,5	MR6	1
0100-3L-0046-5-xxxx	42	MR6	1

Job Id: **262.1-020692-5**
 Certificate No: **TAE00000XZ**
 Revision No: **3**

Mains voltage 380-480V (500V), 50/60Hz, 3~			
Frequency Converter type	Current rating 45 °C continuous current I_{Lout} (A)	Frame size	Enclosure Options
0100-3L-0061-5-xxxx	53,5	MR6	1
0100-3L-0072-5-xxxx	66,5	MR7	1
0100-3L-0087-5-xxxx	79,5	MR7	1
0100-3L-0105-5-xxxx	96	MR7	1
0100-3L-0140-5-xxxx	122,5	MR8	1, 2 and 3
0100-3L-0170-5-xxxx	155	MR8	1, 2 and 3
0100-3L-0205-5-xxxx	187,5	MR8	1, 2 and 3
0100-3L-0261-5-xxxx	233	MR9A	1, 2 and 3
0100-3L-0310-5-xxxx	280,5	MR9A	1, 2 and 3
0100-3L-0386-5-xxxx	347,5	MR9B	1, 2 and 3
0100-3L-0385-5-xxxx	347,5	MR10	2 and 3
0100-3L-0460-5-xxxx	422,5	MR10	2 and 3
0100-3L-0520-5-xxxx	490	MR10	2 and 3
0100-3L-0590-5-xxxx	555	MR10	2 and 3
0100-3L-0651-5-xxxx	620	MR11	2 and 3
0100-3L-0731-5-xxxx	690	MR11	2 and 3
0100-3L-0650-5-xxxx	620	MR12	2 and 3
0100-3L-0730-5-xxxx	690	MR12	2 and 3
0100-3L-0820-5-xxxx	775	MR12	2 and 3
0100-3L-0920-5-xxxx	870	MR12	2 and 3
0100-3L-1040-5-xxxx	980	MR12	2 and 3
0100-3L-1180-5-xxxx	1050	MR12	2 and 3

Mains voltage 525-600V, 50/60Hz, 3~			
Frequency Converter type	Current rating 45 °C continuous current I_{Lout} (A)	Frame size	Enclosure Options
0100-3L-0004-6-xxxx	3,3	MR5	1
0100-3L-0006-6-xxxx	5	MR5	1
0100-3L-0009-6-xxxx	7,55	MR5	1
0100-3L-0011-6-xxxx	10	MR5	1
0100-3L-0018-6-xxxx	15,75	MR6	1
0100-3L-0022-6-xxxx	20	MR6	1
0100-3L-0027-6-xxxx	24,5	MR6	1
0100-3L-0034-6-xxxx	30,5	MR6	1
0100-3L-0041-6-xxxx	37,5	MR7	1
0100-3L-0052-6-xxxx	46,5	MR7	1
0100-3L-0062-6-xxxx	57	MR7	1
0100-3L-0080-6-xxxx	71	MR8	1, 2 and 3
0100-3L-0100-6-xxxx	90	MR8	1, 2 and 3
0100-3L-0125-6-xxxx	112,5	MR8	1, 2 and 3
0100-3L-0144-6-xxxx	134,5	MR9A	1, 2 and 3
0100-3L-0208-6-xxxx	189	MR9A	1, 2 and 3
0100-3L-0261-6-xxxx	234,5	MR9B	1, 2 and 3
0100-3L-0261-6-xxxx	234,5	MR10	2 and 3
0100-3L-0325-6-xxxx	293	MR10	2 and 3

Job Id: **262.1-020692-5**
 Certificate No: **TAE00000XZ**
 Revision No: **3**

Mains voltage 525-600V, 50/60Hz, 3~			
Frequency Converter type	Current rating 45 °C continuous current I_{Lout} (A)	Frame size	Enclosure Options
0100-3L-0385-6-xxxx	355	MR10	2 and 3
0100-3L-0416-6-xxxx	400,5	MR10	2 and 3
0100-3L-0461-6-xxxx	438	MR11	2 and 3
0100-3L-0521-6-xxxx	490	MR11	2 and 3
0100-3L-0460-6-xxxx	438	MR12	2 and 3
0100-3L-0520-6-xxxx	490	MR12	2 and 3
0100-3L-0590-6-xxxx	555	MR12	2 and 3
0100-3L-0650-6-xxxx	620	MR12	2 and 3
0100-3L-0750-6-xxxx	700	MR12	2 and 3
0100-3L-0820-6-xxxx	735	MR12	2 and 3

Mains voltage 525-690V, 50/60Hz, 3~			
Frequency Converter type	Current rating 45 °C continuous current I_{Lout} (A)	Frame size	Enclosure Options
0100-3L-0007-7-xxxx	6,5	MR6	1
0100-3L-0010-7-xxxx	8,75	MR6	1
0100-3L-0013-7-xxxx	11,75	MR6	1
0100-3L-0018-7-xxxx	15,75	MR6	1
0100-3L-0022-7-xxxx	20	MR6	1
0100-3L-0027-7-xxxx	24,5	MR6	1
0100-3L-0034-7-xxxx	30,5	MR6	1
0100-3L-0041-7-xxxx	37,5	MR7	1
0100-3L-0052-7-xxxx	46,5	MR7	1
0100-3L-0062-7-xxxx	57	MR7	1
0100-3L-0080-7-xxxx	71	MR8	1, 2 and 3
0100-3L-0100-7-xxxx	90	MR8	1, 2 and 3
0100-3L-0125-7-xxxx	112,5	MR8	1, 2 and 3
0100-3L-0144-7-xxxx	134,5	MR9A	1, 2 and 3
0100-3L-0170-7-xxxx	157	MR9A	1, 2 and 3
0100-3L-0208-7-xxxx	189	MR9A	1, 2 and 3
0100-3L-0261-6-xxxx	234,5	MR9B	1, 2 and 3
0100-3L-0261-7-xxxx	234,5	MR10	2 and 3
0100-3L-0325-7-xxxx	293	MR10	2 and 3
0100-3L-0385-7-xxxx	355	MR10	2 and 3
0100-3L-0416-7-xxxx	400,5	MR10	2 and 3
0100-3L-0461-6-xxxx	438	MR11	2 and 3
0100-3L-0521-6-xxxx	490	MR11	2 and 3
0100-3L-0460-7-xxxx	438	MR12	2 and 3
0100-3L-0520-7-xxxx	490	MR12	2 and 3
0100-3L-0590-7-xxxx	555	MR12	2 and 3
0100-3L-0650-7-xxxx	620	MR12	2 and 3
0100-3L-0750-7-xxxx	700	MR12	2 and 3
0100-3L-0820-7-xxxx	735	MR12	2 and 3

Job Id: **262.1-020692-5**
Certificate No: **TAE00000XZ**
Revision No: **3**

Application/Limitation

Supply voltage range: 200-240 V / 380-480 (500) V / 525-690 V, 50/60 Hz
Voltage variation: $\pm 10\%$
Frequency variation: 47- 65 Hz
Output frequency: 8 - 320 Hz
Temperature range in operation: 40 - 50 °C derate 1.5% /°C, 50 – 55 °C derate 2,5% /°C
Temperature class: A
Vibration class: A
Humidity class: A
EMC class*: DNV Standard No 2.4 / IEC 61800-3 C2
To be used on EMC class A locations

Documents for the actual application are to be submitted for approval in each case in accordance with DNV Rules Pt.4, Ch.8, Sec.1, Table 2. A Product Certificate is required for converters ≥ 100 kW.

- * Converters EMC classed C2 according to IEC 61800-3 can be installed in "special distribution zone" and "general power distribution zone" in accordance with IEC 60533 provided precautions are taken to attenuate these effects on the distribution system, so the safe operation is assured.
- ** To be installed in an enclosure with an IP degree in accordance with DNV GL Rules w.r.t. location.

The Type Approval covers hardware and software for the basic controller.

Clause for software control:

All changes in software are to be recorded as long as the system is in use on board. The records of all changes are to be forwarded to DNV GL for evaluation and approval. Major changes in the software are to be approved before being installed in the converter.

Type Approval documentation

Technical info:

Email from Marti Tanninen dated 2019-02-14.

"VACON 100 AC DRIVES SIMPLY SUPERIOR" Brochure from Vacon, "Vacon 100 series voltage and current ratings", XL sheet from Vacon.

Test reports:

SGS Fimko test reports 294638-1a & 1b dated 2019-03-13, 276122-2 & 3 issued 2015-01-19, 276122-4 issued 2015-02-16, 276122-2, 3 & 4 Amendment no 1 issued 2015-07-06. 278414-1, 2 & 3 issued 2015-03-12, 278414-4 & 5 issued 2015-03-13 and 265797-1 issued 2012-01-20.

SGS Test Reports no. 293589-1 & -2 dated 2018-10-03, 26977-1 & 2 issued 2013-01-02.

VTT Test Report no VTT-S-01711-8 issued 2018-04-10, VTT-S-00567-18 issued 2018-02-06, VTT-S-01016-15 issued 2015-03-25 & VTT-S-02593-15 issued 2015-06-17.

Vacon Research Reports no. TED10720 to TED10724 issued 2015-07-03 & TED10757 issued 2015-07-17.

TÜV Technical Report No. 71395257, dated 2011-10-12.

Tests carried out

Visual inspection, Performance, Power supply failure, Power supply variations, Voltage/frequency variation, Vibration/shock, Dry heat, Damp heat, Insulation resistance, High voltage.

EMC: Electrical fast transient (Burst), electrical slow transient (Surge), RF-common mode Voltage, radiated RF-electromagnetic fields, electric discharge (ESD), radiated and conducted emission.

Job Id: **262.1-020692-5**
Certificate No: **TAE00000XZ**
Revision No: **3**

Marking of product

Vacon 100 - Type designation – Power – Voltage

Periodical assessment

The scope of the periodical assessment is to verify that the conditions stipulated for the Type Approval is complied with and that no alterations are made to the product design or choice of materials.

The main elements of the assessment are:

- Inspection on factory samples, selected at random from the production line (where practicable)
- Results from Routines (RT) checked (if not available tests according to RT to be carried out)
- Review of type approval documentation
- Review of possible change in design, materials and performance
- Ensuring traceability between manufacturer's product type marking and Type Approval Certificate.

Assessment to be performed at 2 and 3.5 year and at renewal.

END OF CERTIFICATE